Space Weather Forecast

Issued on Sunday 29 December 2024 at 13:30 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate radio blackouts (R1/R2) expected throughout the period. Chance of R3 blackouts.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been High, with a Strong flare observed emanating from the large complex region in the northwest quadrant early on 29 Dec. Further Moderate flares have been observed from regions on the northwest limb, in the southwest, southeast and from regions just beyond the southeast limb.

There are twelve sunspot regions on the Earth-facing side of the Sun. There are four regions of significance due to their magnetic complexity. The largest and most complex region lies in the northwest, with other regions of note in the southwest and northeast. The remaining spots are smaller and simpler.

A filament eruption from the southeast quadrant early on 29 Dec is currently being modelled for a potential earth directed component.

Solar Wind / Geomagnetic Activity: Solar winds showed a slow regime. The total magnetic field strength has been weak, with some brief moderate levels observed towards the end of the observation period. the north-south component of the magnetic field has also varied generally weakly. Geomagnetic activity was Quiet throughout.

Energetic Particles / Solar Radiation: High energy proton flux (greater than 10MeV) at GOES18 remained at background levels throughout, well below the 1-pfu S1/Minor Radiation Storm threshold.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Moderate solar activity is expected through the next four days, with an elevated risk of High activity, especially from AR3936. There is an increasing risk of activity from regions due to rotate onto the visible disc from the far side of the Sun.

Solar Wind / Geomagnetic Activity: No fast winds or CMEs currently feature in the forecast. There is low confidence of CME glances through 30 Dec to 01 Jan, with a partial halo CME possibly arriving at Earth on 31 Dec, although this is still being modelled and is low confidence.

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Geomagnetic activity is expected to be mainly Quiet, but with a Slight Chance of Unsettled to Active (Kp 3-4) intervals should any glancing CME effects occur between 30 Dec to 01 Jan. There is also a risk of G1/Minor Storm intervals should the CME from 29 Dec be Earth directed.

Energetic Particles / Solar Radiation: There is a Slight Chance of S1/Minor Radiation Storm or greater enhancements during the period. The risk slightly increases during the period as significant sunspot regions rotate into a more favourable position.

Geomagnetic Storms

Geomagnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	5	15	15
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X-Ray Flares

X-Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 (M Class)	Yes	90	90	90	90
Very Active	R3-R5 (X Class)	Yes	30	30	30	30

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Solar Radiation Storms (High Energy Protons)

Radiation Storms Probability (Exceedance)	Level ($cm^{-2}sr^{-1}s^{-1}$)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	15	15	15
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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